

FIG. 1A

ggggtttgtta gatatttttc ctttggaaaga aatactgagc accaaggctg ag atg aca 58
Met Thr
1

ctg aag tat tta tgg ctg gtg gcc ctc gtg gct cta tac att tca ccc 106
Leu Lys Tyr Leu Trp Leu Val Ala Leu Val Ala Leu Tyr Ile Ser Pro
5 10 15

atc cag tct cag aac tgt gtg tat ctg gat cat acc atc ttg gaa aac 154
Ile Gln Ser Gln Asn Cys Val Tyr Leu Asp His Thr Ile Leu Glu Asn
20 25 30

atg aaa ctt ctg agc agc atc agg acc acc ttt ccc tta aga tgt cta- 202
 Met Lys Leu Leu Ser Ser Ile Arg Thr Thr Phe Pro Leu Arg Cys Leu
35 40 45 50

aaa gat atc acg gat ttt gag ttt cct caa gag att ctg ctg tac gtc 250
 Lys Asp Ile Thr Asp Phe Glu Phe Pro Gln Glu Ile Leu Leu Tyr Val
55 60 65

cag cat gtg aaa aag gac ata aag gca gtc acc tat cat ata tct tct 298
 Gln His Val Lys Lys Asp Ile Lys Ala Val Thr Tyr His Ile Ser Ser
70 75 80

ctg gcg cta att att ttc agt ctt aaa gac tcc atc tcc ctg gcg aca 346
 Leu Ala Leu Ile Ile Phe Ser Leu Lys Asp Ser Ile Ser Leu Ala Thr
85 90 95

gag gaa cgc ttg gaa cgt atc aga tcg gga ctt ttc aaa caa gtg cag 394
 Glu Glu Arg Leu Glu Arg Ile Arg Ser Gly Leu Phe Lys Gln Val Gln
100 105 110

caa gct cga gag tgc atg gta gac gag gag aac aac acg gag gag 442
 Gln Ala Arg Glu Cys Met Val Asp Glu Glu Asn Lys Asn Thr Glu Glu
115 120 125 130

gac agt aca tca caa cat cct cac tca gag ggc ttc aag gca gtc tac 490
 Asp Ser Thr Ser Gln His Pro His Ser Glu Gly Phe Lys Ala Val Tyr
135 140 145

ctg gaa ttg aac aag tat ttc ttc aga atc aga aag ttc ctg gta aat 538
 Leu Glu Leu Asn Lys Tyr Phe Phe Arg Ile Arg Lys Phe Leu Val Asn
150 155 160

aag aaa tac agt ttc tgt gcc tgg aag att gtc gtg gtg gaa ata aga 586
 Lys Lys Tyr Ser Phe Cys Ala Trp Lys Ile Val Val Val Glu Ile Arg
165 170 175

aga tgt ttc agt ata ttt tac aaa cta ctc aac atg aat tgagaatcat 635
 Arg Cys Phe Ser Ile Phe Tyr Lys Leu Leu Asn Met Asn

180 185 190

ccagcttcaa gcaagaactt agatagaagt tggactgct caaatgtccc caagaacgct 695

FIG. 1B

tgattctaag gctattgcga gtctgctgct acacacttcg gacgcaagac ttttcaaggt 755
cagggttcaa ggtagtagcag tcaaaggaag tcttatgtta agcaaaaagaa aaatttcagt 815
ggaaaagcta gcagaaaatgt caacttgtca aaaaaacaac ttatggatta tggcattgac 875
gttactagca aaaaaataa aacaaaaaaaaa aacaaaaaaaaa 913

FIG. 2A

aagcttaatt taacaaaatt ggaaaaacct aaactatact gtgctctgg gacctagcaa 60
 tcaaataatc acagtcattt ggtcaatgtc tatgattaac tcaatgagac aggatgttg 120
 gctatagdac caggtacaaa aaatataattt tcatgaagga tcactccctc ttatgtata 180
 gatttgggtg agtgagttag tgagttagt catggactca cagctttgg ctttctgaaa 240
 taccctgcat cagtctgtt atgatgattc ctttgtctg ggatggatca tccaggcatt 300
 taaggtaaca cgatggtaat tcttgctca ttttcaggg aaaaaaaaaa gttatcactt 360
 ccaaagtcgg catagtcacc cgaagtaaaa aaaaaaaaaa aaaaaaaaaaag cctcagaggc 420
 aaaggaaagg ggccgcaacc ttggtaact gtgaaatgac gaatgagaaa actcctcctg 480
 ctgaagatat tcaggtatat aaaggcacat gaaggaaac tcaaaacatc attgtcata 540
 acacatcttc tggattttt agcttgcaaa aaaa atg agc acc aaa cct gat atg 595
Met Ser Thr Lys Pro Asp Met
 1 5

att caa aag tgt ttg tgg ctt gag atc ctt atg ggt ata ttc att gct 643
Ile Gln Lys Cys Leu Trp Leu Glu Ile Ile Met Gly Ile Phe Ile Ala
 10 15 20

ggc acc cta tcc ctg gac tgt aac tta ctg aac gtt cac ctg aga aga 691
Gly Thr Leu Ser Leu Asp Cys Asn Leu Leu Asn Val His Leu Arg Arg
 25 30 35

gtc acc tgg caa aat ctg aga cat ctg agt agt atg agc aat tca ttt 739
 Val Thr Trp Gln Asn Leu Arg His Leu Ser Ser Met Ser Asn Ser Phe
 40 45 50 55

cct gta gaa tgt cta cga gaa aac ata gct ttt gag ttg ccc caa gag 787
 Pro Val Glu Cys Leu Arg Glu Asn Ile Ala Phe Glu Leu Pro Gln Glu
 60 65 70

ttt ctg caa tac acc caa cct atg aag agg gac atc aag aag gcc ttc 835
 Phe Leu Gln Tyr Thr Gln Pro Met Lys Arg Asp Ile Lys Lys Ala Phe
 75 80 85

tat gaa atg tcc cta cag gcc ttc aac atc ttc agc caa cac acc ttc 883
 Tyr Glu Met Ser Leu Gln Ala Phe Asn Ile Phe Ser Gln His Thr Phe
 90 95 100

aaa tat tgg aaa gag aga cac ctc aaa caa atc caa ata gga ctt gat 931
 Lys Tyr Trp Lys Glu Arg His Leu Lys Gln Ile Gln Ile Gly Leu Asp
 105 110 115

cag caa gca gag tac ctg aac caa tgc ttg gag gaa gac gag aat gaa 979
 Gln Gln Ala Glu Tyr Leu Asn Gln Cys Leu Glu Glu Asp Glu Asn Glu
 120 125 130 135

FIG. 2B

aat gaa gac atg aaa gaa atg aaa gag aat gag atg aaa ccc tca gaa 1027
Asn Glu Asp Met Lys Glu Met Lys Glu Asn Glu Met Lys Pro Ser Glu
140 145 150

gcc agg gtc ccc cag ctg agc agc ctg gaa ctg agg aga tat ttc cac 1075
Ala Arg Val Pro Gln Leu Ser Ser Leu Glu Leu Arg Arg Tyr Phe His
155 160 165

agg ata gac aat ttc ctg aaa gaa aag aaa tac agt gac tgt gcc tgg 1123
Arg Ile Asp Asn Phe Leu Lys Glu Lys Lys Tyr Ser Asp Cys Ala Trp
170 175 180

gag att gtc cga gtg gaa atc aga aga tgt ttg tat tac ttt tac aaa 1171
Glu Ile Val Arg Val Glu Ile Arg Arg Cys Leu Tyr Tyr Phe Tyr Lys
185 190 195

ttt aca gct cta ttc agg agg aaa taaggtatat ttttggatt aaaattcctt 1225
Phe Thr Ala Leu Phe Arg Arg Lys
200 205

tccctccga aatctcttc tccttctcct cctccatctt ctttttaagg attgttgtgc 1285

tgtcctgtaa gcctgtcctc agttggactg gtgcctcgg aacatcaggg acactcacct 1345

ctctaaggag aggttaatgcc aaccatcctc agggtgacca agagtctcct tagaaagtct 1405

ttaagacatt tttaaaggaa taagattccc tctccgtctt cttctattct ctcttgctct 1465

tttctgtggc cattttgaaa gagctttgct atatatacca cctgtggact tcaccaagac 1525

aatggctaga ggatagggag cagagaatgt tgcaaaatgg taacattca atgacttaac 1585

tgttttgctg ccaagggtgc ttatcctatg aaaattcagc acattaaaag agcttataca 1645

tgctccctag agtcaatact cttgcatttt cccctcctg ctcggggga aaaaggttga 1705

catttctggc ccatttcctt ctcagcttgg tttgtttgaa ttgatgctt ggaatggta 1765

tttcattact ttaagagtga agatccatag tgaatttgg a tggatggttt aattagacga 1825

ccatataagct t 1836

FIG. 3

1	50
huIFN-L	MSTKPDMIQK CLWLEILMGI FIAGTLSLDC NLLNVHLRRV TWQNLRLSS
raIFN-L	~~~~~MTLK YLWLVALVAL YISPIQSQNCVYLDHT ILENMKLLSS
huIFN- β	~~~~~MTNK CLLQIALLLC FSTTALSMSY NLLGFLQRSS NFQCQKLLWQ
cons	-----MT-K CLWL-AL--- FI---LS--C NLL-V-LR--- --QN-KLLSS
51	100
huIFN-L	MSNSFPVECL RENIAFELPQ EFLQYTQPMK RDIKKAFYEM SLQAFNIFS.
raIFN-L	IRTTFPLRCL KDITDFEFPO EILLYVQHVK KDIKAVTYHI SSLALIIFSL
huIFN- β	LNGRLEY.CL KDRMNFDIPE EIKQLQQFQK EDAALTIYEM LQNIFAIFRQ
cons	----FP--CL KD---FE-PQ EILQY-Q--K -DIK---YEM S--AF-IFS-
101	150
huIFN-L	QHTFKYWKER HLKQIQIGLD QQAEYLNQCL EEDENENEDM KEMKENEMKP
raIFN-L	KDSISLATEE RLERIRSGLF KQVQQARECM VDEENKNT. .EDSTSQHPH
huIFN- β	DSSSTGWNET IVENLLANVY HQINHLKTVL .EEKLEKEDF TRGK.....
cons	--S---W-E- -LE-I--GL- -Q---L--CL -EEENENED- -E-K-----
151	200
huIFN-L	SEARVPQLSS LELRRYFHRI DNFLKEKKYS DCAWEIVRVE IRRCLYYFYK
raIFN-L	SEGF..KAVY LELENKYFFRI RKFLVNKKYS FCAWKIVVVE IRRCSIFYK
huIFN- βLMSS LHLKRYYGRI LHYLKAKEYS HCAWTIVRVE ILRNFYFINR
cons	SE-----SS LEL-RYF-RI --FLK-KKYS -CAW-IVRVE IRRCFY-FYK
201	
huIFN-L	FTALFRRK
raIFN-L	LLNMN~~~
huIFN- β	LTGYLRN~
cons	LT---R--

FIG. 4

cat atg tgt gta tat ctc gat cat act atc ttg gag aat atg aaa ctt	48
Met Cys Val Tyr Leu Asp His Thr Ile Leu Glu Asn Met Lys Leu	
1 5 10 15	
ctg agc agc atc cgt acc acc ttt cct ctg cgt tgt ctg aaa gat atc	96
Leu Ser Ser Ile Arg Thr Thr Phe Pro Leu Arg Cys Leu Lys Asp Ile	
20 25 30	
acg gat ttt gag ttt cct caa gag att ctg ctg tac gtc cag cat gtg	144
Thr Asp Phe Glu Phe Pro Gln Glu Ile Leu Leu Tyr Val Gln His Val	
35 40 45	
aaa aag gac ata aag gca gtc acc tat cat ata tct tct ctg gcg cta.	192
Lys Lys Asp Ile Lys Ala Val Thr Tyr His Ile Ser Ser Leu Ala Leu	
50 55 60	
att att ttc agt ctt aaa gac tcc atc tcc ctg gcg aca gag gaa cgc	240
Ile Ile Phe Ser Leu Lys Asp Ser Ile Ser Leu Ala Thr Glu Glu Arg	
65 70 75	
ttg gaa cgt atc aga tcg gga ctt ttc aaa caa gtg cag caa gct cga	288
Leu Glu Arg Ile Arg Ser Gly Leu Phe Lys Gln Val Gln Gln Ala Arg	
80 85 90 95	
gag tgc atg gta gac gag gag aac aac acg gag gag gac agt aca	336
Glu Cys Met Val Asp Glu Glu Asn Lys Asn Thr Glu Glu Asp Ser Thr	
100 105 110	
tca caa cat cct cac tca gag ggc ttc aag gca gtc tac ctg gaa ttg	384
Ser Gln His Pro His Ser Glu Gly Phe Lys Ala Val Tyr Leu Glu Leu	
115 120 125	
aac aag tat ttc ttc aga atc aga aag ttc ctg gta aat aag aaa tac	432
Asn Lys Tyr Phe Phe Arg Ile Arg Lys Phe Leu Val Asn Lys Lys Tyr	
130 135 140	
agt ttc tgt gcc tgg aag att gtc gtg gtg gaa att cgt cgt tgt ttc	480
Ser Phe Cys Ala Trp Lys Ile Val Val Glu Ile Arg Arg Cys Phe	
145 150 155	
agt att ttt tac aaa ctg ctg aac atg aat taatggatcc	520
Ser Ile Phe Tyr Lys Leu Leu Asn Met Asn	
160 165	

FIG. 5

cat atg tgt gta tat ctc gat cat act atc ttg gag aat atg aaa ctt	48
Met Cys Val Tyr Leu Asp His Thr Ile Leu Glu Asn Met Lys Leu	
1 5 10 15	
ctg agc agc atc cgt acc acc ttt cct ctg cgt tgt ctg aaa gat atc	96
Leu Ser Ser Ile Arg Thr Thr Phe Pro Leu Arg Cys Leu Lys Asp Ile	
20 25 30	
acg gat ttt gag ttt cct caa gag att ctg ctg tac gtc cag cat gtg	144
Thr Asp Phe Glu Phe Pro Gln Glu Ile Leu Leu Tyr Val Gln His Val	
35 40 45	
aaa aag gac atc aag gca gtc acc tat cat atc tct tct ctg gcg ctg	192
Lys Lys Asp Ile Lys Ala Val Thr Tyr His Ile Ser Ser Leu Ala Leu	
50 55 60	
att att ttc agt ctt aaa gac tcc atc tcc ctg gcg aca gag gaa cgc	240
Ile Ile Phe Ser Leu Lys Asp Ser Ile Ser Leu Ala Thr Glu Glu Arg	
65 70 75	
ttg gaa cgt atc cgt tct ggt ctt ttc aaa caa gtg cag caa gct cgt	288
Leu Glu Arg Ile Arg Ser Gly Leu Phe Lys Gln Val Gln Gln Ala Arg	
80 85 90 95	
gag tgc atg gta gac gag gag aac aag aac acg gag gag gac agt aca	336
Glu Cys Met Val Asp Glu Glu Asn Lys Asn Thr Glu Glu Asp Ser Thr	
100 105 110	
tca caa cat cct cac tca gag ggc ttc aag gca gtc tac ctg gaa ttg	384
Ser Gln His Pro His Ser Glu Gly Phe Lys Ala Val Tyr Leu Glu Leu	
115 120 125	
aac aag tat ttc ttc cgt atc cgt aag ttc ctg gta aat aag aaa tac	432
Asn Lys Tyr Phe Phe Arg Ile Arg Lys Phe Leu Val Asn Lys Lys Tyr	
130 135 140	
agt ttc tgt gcc tgg aag att gtc gtg gtg gaa att cgt cgt tct ttc	480
Ser Phe Cys Ala Trp Lys Ile Val Val Glu Ile Arg Arg Ser Phe	
145 150 155	
agt att ttt tac aaa ctg ctg aac atg aat taatggatcc	520
Ser Ile Phe Tyr Lys Leu Leu Asn Met Asn	
160 165	

FIG. 6

tctagaaaagg aggaataaca t atg tgt aac ctg ctg aac gtt cac ctg cgt	51
Met Cys Asn Leu Leu Asn Val His Leu Arg	
1 5 10	
cgt gtt acc tgg caa aat ctg aga cat ctg agt agt atg agc aat tca	99
Arg Val Thr Trp Gln Asn Leu Arg His Leu Ser Ser Met Ser Asn Ser	
15 20 25	
ttt cct gta gaa tgt cta cga gaa aac ata gct ttt gag ttg ccc caa	147
Phe Pro Val Glu Cys Leu Arg Glu Asn Ile Ala Phe Glu Leu Pro Gln	
30 35 40	
gag ttt ctg caa tac acc caa cct atg aag agg gac atc aag aag gcc	195
Glu Phe Leu Gln Tyr Thr Gln Pro Met Lys Arg Asp Ile Lys Lys Ala	
45 50 55	
ttc tat gaa atg tcc cta cag gcc ttc aac atc ttc agc caa cac acc	243
Phe Tyr Glu Met Ser Leu Gln Ala Phe Asn Ile Phe Ser Gln His Thr	
60 65 70	
ttc aaa tat tgg aaa gag aga cac ctc aaa caa atc caa ata gga ctt	291
Phe Lys Tyr Trp Lys Glu Arg His Leu Lys Gln Ile Gln Ile Gly Leu	
75 80 85 90	
gat cag caa gca gag tac ctg aac caa tgc ttg gag gaa gac gag aat	339
Asp Gln Gln Ala Glu Tyr Leu Asn Gln Cys Leu Glu Glu Asp Glu Asn	
95 100 105	
gaa aat gaa gac atg aaa gaa atg aaa gag aat gag atg aaa ccc tca	387
Glu Asn Glu Asp Met Lys Glu Met Lys Glu Asn Glu Met Lys Pro Ser	
110 115 120	
gaa gcc agg gtc ccc cag ctg agc agc ctg gaa ctg agg aga tat ttc	435
Glu Ala Arg Val Pro Gln Leu Ser Ser Leu Glu Leu Arg Arg Tyr Phe	
125 130 135	
cac agg ata gac aat ttc ctg aaa gaa aag aaa tac agt gac tgt gcc	483
His Arg Ile Asp Asn Phe Leu Lys Glu Lys Tyr Ser Asp Cys Ala	
140 145 150	
tgg gag att gtc cga gtg gaa atc cgt cgt tgc ctg tac tac ttt tac	531
Trp Glu Ile Val Arg Val Glu Ile Arg Arg Cys Leu Tyr Tyr Phe Tyr	
155 160 165 170	
aaa ttt acc gct ctg ttc cgt cgt aaa taatggatcc	568
Lys Phe Thr Ala Leu Phe Arg Arg Lys	
175	

FIG. 7

tctagaaaagg aggaataaca t atg aac ctg ctg aac gtt cac ctg cgt	51
Met Cys Asn Leu Leu Asn Val His Leu Arg	
1 5 10	
cgt gtt acc tgg caa aat ctg aga cat ctg agt agt atg agc aat tca	99
Arg Val Thr Trp Gln Asn Leu Arg His Leu Ser Ser Met Ser Asn Ser	
15 20 25	
ttt cct gta gaa tgt cta cga gaa aac ata gct ttt gag ttg ccc caa	147
Phe Pro Val Glu Cys Leu Arg Glu Asn Ile Ala Phe Glu Leu Pro Gln	
30 35 40	
gag ttc ctg caa tac acc caa cct atg aag agg gac atc aag aag gcc.	195
Glu Phe Leu Gln Tyr Thr Gln Pro Met Lys Arg Asp Ile Lys Lys Ala	
45 50 55	
ttc tat gaa atg tcc cta cag gcc ttc aac atc ttc agc caa cac acc	243
Phe Tyr Glu Met Ser Leu Gln Ala Phe Asn Ile Phe Ser Gln His Thr	
60 65 70	
ttc aaa tat tgg aaa gag aga cac ctc aaa caa atc caa ata gga ctt	291
Phe Lys Tyr Trp Lys Glu Arg His Leu Lys Gln Ile Gln Ile Gly Leu	
75 80 85 90	
gat cag caa gca gag tac ctg aac caa tgc ttg gag gaa gac gag aat	339
Asp Gln Gln Ala Glu Tyr Leu Asn Gln Cys Leu Glu Glu Asp Glu Asn	
95 100 105	
gaa aat gaa gac atg aaa gaa atg aaa gag aat gag atg aaa ccc tca	387
Glu Asn Glu Asp Met Lys Glu Met Lys Glu Asn Glu Met Lys Pro Ser	
110 115 120	
gaa gcc agg gtc ccc cag ctg agc agc ctg gaa ctg agg aga tat ttc	435
Glu Ala Arg Val Pro Gln Leu Ser Ser Leu Glu Leu Arg Arg Tyr Phe	
125 130 135	
cac agg ata gac aat ttc ctg aaa gaa aag aaa tac agt gac tgt gcc	483
His Arg Ile Asp Asn Phe Leu Lys Glu Lys Lys Tyr Ser Asp Cys Ala	
140 145 150	
tgg gag att gtc cga gtg gaa atc cgt cgt tct ctg tac tac ttt tac	531
Trp Glu Ile Val Arg Val Glu Ile Arg Arg Ser Leu Tyr Tyr Phe Tyr	
155 160 165 170	
aaa ttt acc gct ctg ttc cgt cgt aaa taatggatcc	568
Lys Phe Thr Ala Leu Phe Arg Arg Lys	
175	

FIG. 8

cat atg ctg gac tgt aac ctg ctg aac gtt cac ctg cgt cgt gtt acc	48
His Met Leu Asp Cys Asn Leu Leu Asn Val His Leu Arg Arg Val Thr	
1 5 10 15	
tgg caa aat ctg aga cat ctg agt agt atg agc aat tca ttt cct gta	96
Trp Gln Asn Leu Arg His Leu Ser Ser Met Ser Asn Ser Phe Pro Val	
20 25 30	
gaa tgt cta cga gaa aac ata gct ttt gag ttg ccc caa gag ttt ctg	144
Glu Cys Leu Arg Glu Asn Ile Ala Phe Glu Leu Pro Gln Glu Phe Leu	
35 40 45	
caa tac acc caa cct atg aag agg gac atc aag aag gcc ttc tat gaa	192
Gln Tyr Thr Gln Pro Met Lys Arg Asp Ile Lys Lys Ala Phe Tyr Glu	
50 55 60	
atg tcc cta cag gcc ttc aac atc ttc agc caa cac acc ttc aaa tat	240
Met Ser Leu Gln Ala Phe Asn Ile Phe Ser Gln His Thr Phe Lys Tyr	
65 70 75 80	
tgg aaa gag aga cac ctc aaa caa atc caa ata gga ctt gat cag caa	288
Trp Lys Glu Arg His Leu Lys Gln Ile Gln Ile Gly Leu Asp Gln Gln	
85 90 95	
gca gag tac ctg aac caa tgc ttg gag gaa gac gag aat gaa aat gaa	336
Ala Glu Tyr Leu Asn Gln Cys Leu Glu Asp Glu Asn Glu Asn Glu	
100 105 110	
gac atg aaa gaa atg aaa gag aat gag atg aaa ccc tca gaa gcc agg	384
Asp Met Lys Glu Met Lys Glu Asn Glu Met Lys Pro Ser Glu Ala Arg	
115 120 125	
gtc ccc cag ctg agc agc ctg gaa ctg agg aga tat ttc cac agg ata	432
Val Pro Gln Leu Ser Ser Leu Glu Leu Arg Arg Tyr Phe His Arg Ile	
130 135 140	
gac aat ttc ctg aaa gaa aag aaa tac agt gac tgt gcc tgg gag att	480
Asp Asn Phe Leu Lys Glu Lys Tyr Ser Asp Cys Ala Trp Glu Ile	
145 150 155 160	
gtc cga gtg gaa atc cgt cgt tgc ctg tac tac ttt tac aaa ttt acc	528
Val Arg Val Glu Ile Arg Arg Cys Leu Tyr Tyr Phe Tyr Lys Phe Thr	
165 170 175	
gct ctg ttc cgt cgt aaa taatggatcc	556
Ala Leu Phe Arg Arg Lys	
180	